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The Fowl Leukosis Complex

II. Clinical manifestations of the disease†

C. D. Lee, D.V.M., M.S.*

Neural Form

THE clinical symptoms in this disease complex vary according to the location and degree of involvement of the affected tissues or organs. Cases suffering from lymphomatosis of the nerve type, may be observed as a unilateral, bilateral, local or general paralysis. Paralysis of one or both legs, or paralysis of one or both wings is most commonly observed. These manifestations may be only slight or may be so severe that the fowl is practically helpless.

Frequently, when the legs are involved, common characteristics may be observed such as—stiffness, lameness, walking in a stilty manner with a tendency toward extending the affected leg or legs backward, forward or straight from the body, or one leg may be extended forward while the other is extended backward.

In more advanced cases the bird may go completely down, dragging itself about assisted by the wings. When the brain is involved, various lethargic symptoms are observed as well as abnormal head movements, such as a waving motion of the head, throwing the head backward or the beak downward, lateral deviations and in general a lack of ability to hold the head in a normal position.

Many cases show a paralysis, partial or complete, of many of the visceral organs, the severity depending upon the amount

of involvement or site of involvement of nerves or nerve plexuses supplying the part. In some cases associated with involvement of the vagus nerve, difficult respiration evidenced by breathing through the mouth has been observed.

In general, any variation may be observed depending upon the nerve or nerve plexuses involved. The onset may be gradual or sudden, and the course is variable. The disease may be rapidly progressive or may progress slowly. We have never observed a complete recovery of affected cases, although temporary respites sometimes occur. Emaciated conditions are frequently observed, especially in chronic cases. This emaciation seems to be due largely to difficulty in securing food or difficulty in utilizing it. Many cases retain the appetite throughout the course of the disease, and many birds that are practically helpless will eat and drink as long as they can reach the feed and water containers.



Neural form showing characteristic paralysis

† In the spring issue of the *Veterinary Student*, Dr. Lee reviewed the current literature of the Fowl Leukosis complex.
—The Editor

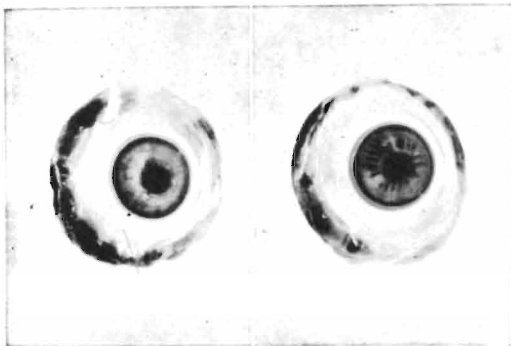
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Ocular Form

In the eye cases the iris frequently shows, in the beginning, a de-pigmented circle around the pupil. This circle is grey at first or may be in only a slightly faded condition and may extend to such an degree that the normal bay color is almost completely replaced. The process may start in any part of the iris as a small depigmented spot or it may start as a generalized depigmented process throughout the iris, characterized by a faded grey appearance.

In many cases the depigmentation appears to start in several places in the iris at the same time, giving the appearance of a normal bay color interspersed with faded or grey areas.

In many cases the depigmentation is quite irregular and has a streaked appearance, mingling the normal bay color with that of a pathological grey. The color changes may vary from a faded bay to a dark or light grey, bluish grey or slate color. In some cases a black-colored tissue appears as a multiple tumorous mass. As a rule both eyes are involved, with one appearing to be more severely affected than the other.



Ocular Lymphomatosis

However, many cases show involvement of only one eye. In a high percentage of cases, regular or irregular constriction of the pupil occurs with impaired vision or even blindness. Opacity of the cornea has been observed in a few cases. The ocular, as well as other types of fowl leukosis, has a very variable course. The process may spread rapidly or very slowly, and in many cases it appears as though

the disease has become arrested. The birds usually remain in good health unless blindness occurs or unless the eye type cases become complicated with other expressions of the disease.

Frequently we have observed cases that were uncomplicated eye cases in the beginning develop some other type after a variable length of time. We have also seen several uncomplicated eye cases that have lived two years without any great impairment of health.

While most of the popular breeds of chickens normally should have a reddish-bay colored iris, there are some that do not have. The iris of the Cornish, and some game birds, is normally a yellow or pearl color and many crosses of this breed normally may have pearl or grey eyes.

Some breeds also normally have a dark brown or nearly mahogany colored iris. Some strains of breeds that are supposed to have reddish bay irises may produce individuals that have light colored irises. The above factors, as well as faded or grey irises from other causes, such as general weakness, different feeding practices and dietary factors, should always be considered in making diagnoses in questionable cases.

Visceral Form

Clinical symptoms in cases affected with lymphocytoma tumors and tumor-like infiltrations in various organs vary greatly, depending upon the tissues or organs involved. Lameness has been observed in cases where a tumorous mass was found pressing on a corresponding nerve or nerve plexus. Diarrhea and emaciation are quite common in the more chronic cases. Many cases in good flesh have died suddenly and upon autopsy were found to be suffering from an enormously enlarged infiltrated liver. Rupture of the liver has occurred frequently in such cases. Pendulous abdomen has been observed in a few cases.

Respiratory difficulty was observed in a few cases which upon autopsy showed an involvement of the lungs by lymphocytomatosis and hemocytoblastosis tissue infiltrations. The symptoms in general are



Visceral form showing tumor-like infiltrations

more obscure than the other types of the disease. A negative blood picture does not necessarily mean the bird is not affected.

Osteopetrotic (Marble Bone) Form

This form of the complex was first described by Junghur and Landauer in 1938 and is possibly the most rare form of the avian leukosis complex and of least economic importance.

In general, the diseased metatarsus or unfeathered portion of the leg is often recognized on clinical examination. In the beginning stages the metatarsus may show a definite convexity of the anterior surface, irregular lumps in the proximal metaphyseal region or a thickening of the diaphysis. The affected areas are firm and insensitive to the touch. In advanced cases greatly enlarged and deformed bones of the legs and wings are very noticeable. In general, the tibia, fibula, femur, humerus, ulna, radius, metacarpus, coracoid, clavicle, and sternum are involved and show varying degrees of thickening.

The transmissible agent of osteopetrosis is present in the blood, bone marrow, lymphomata and is indistinguishable from the agents of other forms of lymphomatosis.

Erythroleukosis

Many degrees of clinical manifestations are noted in cases of the greatly varying erythroid type. The most characteristic symptom shown is a severe anemia with a definite icterus of the skin of the face. The tendency in most of these cases is toward emaciation. However, the condition of flesh in many cases may be deceiving as it is frequently observed that birds appearing to be in excellent flesh are somewhat edematous and soft.

Positive blood findings of numerous hemocytoblasts and basophil erythroblasts in the peripheral circulation, presumable precursors of erythrocytes, are frequently encountered. A negative blood picture may not at all times mean that the bird is not affected with some expression of the disease.

The course of the disease is also very variable, in some cases progressing rapidly and in others slowly. The disease may appear to be arrested, but complete recovery has never been noted. The severity of symptoms is no indication of the extent of involvement. The appetite usually remains normal except in the very acute, generalized case and in cases of prostrated birds.

Myeloid Leukosis

The clinical manifestations of myeloid leukosis are very variable. The onset may be gradual or very rapid, and general weakness with diarrhea is quite common. Marked lesions are frequently found in those cases in which marked infiltration in various organs is found on autopsy. The lameness may occur in one or in both legs, but in most cases occurs in both. The skin, comb, and wattles may not show any color changes, while in some cases varying degrees of anemia as well as a peculiar pallor may be observed. The presence of large numbers of myelocytic elements in the peripheral circulation serves to make a diagnosis. The tendency in these cases is toward a rather rapid emaciation.

To find out whether the disease was heritable, affected birds were mated. Matings were made of paralyzed birds

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granted for extension of the trials under rigid supervision to certain heavily infected sections of Iowa. In Nebraska, vaccination for the most part has been performed on farms where swine raising had become unprofitable or impossible because of the annual occurrence of the disease, and reports show that on many such farms, by early vaccination, the disease has been controlled and the industry has been restored to a profitable status. It will doubtless prove true, though, as it has in Europe, that yearly immunization will have to be the practice, since premises once heavily infected will likely remain so indefinitely.

Health Hazard

Like Bang's disease in swine and cattle, swine erysipelas constitutes an important human health hazard. It is not the same as human erysipelas, but is of itself readily transmissible to man, causing most generally a localized infection called erysipeloid by the medical profession. Its transmission usually occurs through more intimate handling of swine with hands bearing scratches or injuries to the skin. Its incidence is highest in packing house workers, meat cutters, and veterinarians. Few, if any, deaths in man have been reported, but long, painful sieges of inflammation are common, stubborn to any line of treatment yet devised. Handling of infected animals and disposal of infected carcasses should be done with care.

Swine erysipelas in the United States today offers promise of being an increasingly serious threat to the swine industry. The closest cooperation between the veterinarian, the swine raiser, and the government will be necessary if this menace is to be controlled. It is with the veterinarian, especially, that the responsibility for the control of swine erysipelas rests.

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FOWL LEUKOSIS

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with very little success because of lack of production or fertility. Birds suffering from erythroleukosis or myeloid leukosis rarely produce eggs. In cases of ocular type, or eye type, birds may produce normally with a normal degree of fertility. Matings were made of iritis females and iritis males. The birds were hatched and placed in isolated colony houses. During a twelve-month period 65 per cent of these birds died of some form of the fowl paralysis complex. Matings were made of iritis females and normal males, and about 50 per cent of these birds died of the complex. Matings of normal females with an iritis male were made and about 16 per cent of the chicks hatched from this mating died of fowl leukosis.

To further this investigation, blood from day old chicks hatched from a mating of iritis females and males was injected into one week old susceptible stock from our own breeding flocks. These inoculations resulted in a 60 per cent mortality from some form of fowl leukosis during a twelve month period. These experiments were repeated using blood from one week old chicks from iritis matings and at weekly intervals for twelve weeks, and then at monthly intervals up to twelve months. The blood was found to be infective at all ages.

Control Methods

A rigid culling program which eliminates all birds with faded grey eyes, light colored comb and wattles, lame or paralyzed birds, and extremely light birds, will serve to eliminate carriers, thus greatly decreasing the incidence of this disease in the flock.

When the disease becomes prevalent, the above procedures should be followed and the birds surviving kept as a source of resistant breeding stock.

Only in extreme cases should a flock be disposed of and new birds brought on the premises as they will often be very susceptible to the disease, whose infective agent is already present on the premises.

Summary and Conclusions

The disease known as range paralysis or fowl paralysis is more aptly named fowl leukosis and this term includes the various manifestations such as paralysis, tumors, iritis, erythroleukosis and myeloid leukosis.

The disease in all its manifestations may be produced by injecting infective material, by contact of healthy with diseased chicks, and by contact of healthy birds with infested premises or litter.

An injection of a suspension made from one type of this disease produced all the manifestations generally attributed to this disease.

The disease has an extremely long incubation period in most instances, as chicks injected at one week of age did not show symptoms or die of the disease until between four and eight months of age. The disease rarely attacks birds over twelve months of age.

There seems to be a definite inherent resistance and susceptibility to the disease, thus the most important control measures are careful culling, sanitation, and breeding from resistant sources.

The disease was transmitted by way of the egg in mating of iritis birds. The virus was present in the blood of chicks of such mating at as early an age as one day.

DIVISIONAL NEWS

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Veterinary Medical Association at its meeting in Great Falls, Mont.

Dr. W. G. Venske has been ordered to report for his physical examination preparatory to going on active duty in the Army.

Students

Veterinary students have now received their commissions in the United States Army Reserve. Students took the oath of office as second lieutenants in the Medical Administrative Corps during the last week in June.

Robert Loftin, '43, was awarded the Lane-Wells scholarship at the Honor's

Day Convocation held on May 20. The scholarship is presented annually to an outstanding junior student of veterinary medicine.

Robert Kirkpatrick, '43, has been elected vice president of the varsity "I" Club. Roy Reppert, '43, and Jim Rhodes, '43, are new members of the organization. Membership in the organization is limited to students who have won varsity letters in athletic competition.

Engagements

Melvin Karber, '43, announced his engagement to Miss Mildred Giesenberg, H. Ec. Sr., of Marshalltown on May 10.

Another engagement in the senior class was that of Robert Banks to Miss Analee McCormick of Clarence, Iowa.

Philip Peterson, '45, announced his engagement to Miss Elizabeth Shelledy H.Ec. Sr., on May 15.

Edward Foley, '44, announced his engagement to Miss Mary Alice Gage, H. Ec. Sr., from Rochester, New York, on July 13.

Marriages

Clarence Mannasmith, '43, was married to Miss Dorothea Doughty of Colfax, Iowa, on May 21 in Colfax.

Robert Wagner, '44, was married to Miss Virginia Buddin of Carroll, Iowa on January 24, 1942 at Savannah, Missouri.

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ABSTRACTS

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this pathological cycle is to raise the blood oestrogen level to that stage at which the corpus luteum regresses. This can be done by injecting 25 mg. of stilboestrol dipropionate and potentiating the uterus into rhythmic contractions by injecting posterior lobe pituitary. A similar treatment may be used in case of pyometra.

(Brownlee, G. (Wellcome Physiol. Res. Lab., Beckenham). 1942. The clinical application of stilboestral dipropionate. Vet. Rec. 54(10):104-105.)